Art. XIII.—*On the Ornamental Stones of the Colony.* By Mr. J. C. Newbery.

[Read 30th July, 1868.]

The colony is indebted to the Rev. Dr. Bleasdale, for his valuable papers read from time to time on the occurrence of precious stones in the colony—real gem stones, and we all know with what splendid success his researches in this direction have been rewarded. The object of this paper is to draw attention to a larger class of stones of less value, yet well adapted in many cases for jewellers' purposes; pedestals, for statuettes; small vases; inlaying as in table-tops; and building and architectural purposes. There are no doubt many omissions from the list which is given, but this paper must be looked on as little more than an introduction to the subject.

The first stone, or rather species, that claims our attention is quartz, with its chalcedonic varieties, which will include rock crystal, cairngorm, amethyst, smoky quartz; and, amongst the true chalcedonic varieties, agate, common chalcedony, cornelian, onyx, jasper, &c.

The principal locality of occurrence for the first four kinds of quartz is the Beechworth district. Pebbles of considerable size and great beauty, as regards colour and transparency, occur there in auriferous drifts of numerous gullies and creeks. Amethysts of sufficient size or value for cutting are far rarer than the three other kinds; although, as specimens for mineral collections or as small ornaments, such as the heads of breast-pins, &c., the pretty, perfect crystals, double hexagonal pyramids with prism, occurring in the drift and in the narrow veins traversing the granite rock bottom at Eldorado and Sebastopol deserve mention. The other localities where these varieties of stones are found are the Upper Yarra goldfields, Bendigo, White Hills, Bradford Lead (Maldon), and a few other places. There is scarcely a doubt that the Bradford Lead, Maldon, is worthy of attention, and that a search in the heaps of pebble drift taken from hundreds of shafts sunk along the extent of the lead would be well rewarded. For the chalcedonic varieties Beechworth is also the principal place of occurrence, as was well exemplified by the fine collection of onyxes, cornelians, and agates of diversified and beautiful patterns shown at the late Intercolonial Exhibition. Common chalcedony in

irregular pieces is found in veins in the decomposed older basaltic rocks of Phillip Island, and can be collected in great abundance along the sea-beach at the foot of the basalt escarpment. Most of the pieces have a neat pattern formed by alternating concentric white and bluish-white bands; several centres often occurring on one stone. Many have fissures or cracks in them; the sides of which are often coated with quartz crystals; in others, these fissures are filled with carbonate of lime. Remembering the successful practice carried on for many years by the lapidaries of Oberstein and Idar, in Germany, of artificially colouring common chalcedony, producing, by chemical means, bands and spots of different colour throughout the stone; making them thus look like chrysoprose, agate, onyx, sardonyx, &c., a few preliminary experiments have been made in the laboratory with pieces of chalcedony from Phillip Island, with a view to producing artificial onyx, and the results have been so far successful as to permit the hope that if the process was properly executed according to the now known process, good artificial onyx's could be produced.

This art of colouring stones was according to Pliny known to the Romans. He says in the 75th chapter of the 37th book, that certain gemmæ of agate (cochlides) might not be natural, but artificially made. He further narrates that glebæ (nodules of agate) were found in Arabia; which, if boiled in honey for seven days and nights for the purpose of cleansing them from impure and earthy matters, could then be prepared by artists in such a manner that they received coloured bands and spots.

This secret seems to have been lost for a long time; but during the last century the Roman lapidaries were known to possess it. They collected the chalcedony from the German miners, sending travellers for the purchase, who, by some secret process detected the stones fitted for the purpose.

This manner of trading attracted attention, and the secret was bought from an Italian traveller by a miner who first secretly practised it by himself, but it since became generally known, and is indeed very simple. Specimens of chalcedony which contain amongst the concentric or parallel veins some that are softer, and therefore, more permeable by fluids, are chosen; and this property can be tolerably well detected by mounting the stone and noticing whether any absorption takes place. The stones which shew the greatest irregularity in this respect are the best fitted for the purpose. The

process then consists of washing the stones carefully, and allowing them to dry at the temperature of the air, and then placing them in a solution of honey diluted with water, in the proportion of half-a-pound of honey mixed with a quart of water. The stones are kept in this solution at a temperature somewhat below boiling heat, for from fourteen to twenty days; water being added from time to time to supply that lost by evaporation. After this the stones are removed, carefully washed, and then placed in common sulphuric acid, which carbonizes the honey that has been absorbed into the pores of the stone, leaving black lines and bands. Using other solutions, of course other colours would be obtained. Nickel and chrome would produce green chrysoprose. It is necessary to notice the discovery of chalcedony in the Dandenong district, whence several specimens of a very well-handed variety have been brought by Mr. Hardy. They occur there with dark brown opaline flints, and are probably derived from the older basaltic formations which occur in the neighbourhood, and have been subjected to denudation.

Another locality where agates and jaspers have been found in abundance is on the Cape Otway coast, near the mouth of the Gellibrand river. Mr. Wilkinson, in exploring this portion of the country some years ago, found that the coast was covered with a bed of shingle, composed of pebbles of jasper, dense quartz rock, and various very fine kinds of porphyry. Rock masses similar to these latter are not known in the colony; therefore, it is supposed that they are derived from a conglomerate composed of these pebbles, which must form the bottom of Bass' Straits at this point, and stands, perhaps, in some near relation to our upper palæzoic conglomerates that appear as small outlines over the central portion of the colony.

As nearest allied to the stones forming varieties of quartz, it is right to throw a passing glance at the class of common opal, opal-jasper, semi-opal, and wood-opal, which occur in many places in the colony. Though not of any very great beauty, they are in Europe frequently fashioned into neat ornaments; those of wood-opal especially forming objects of considerable interest. The common opal, semi-opal, and opal-jasper are usually of a blue-brown or yellowish-green colour; they are found in the basaltic clays near Melbourne, Keilor, Bacchus Marsh, and Sunbury.

Wood-opal, of various shades of brown, in which the

grains of the wood is easily detected by the differences in colour, occur at the Bass River, Western Port, in the Grampians, and in the leads at Daylesford and Ballarat. With reference to colour, there is one, green, which is very poorly represented in Victoria, both in gem and ornamental stones. We have neither the emerald or chrysolite (olivine, a variety of the latter occurs abundantly in the basalt, but is of no value for the lapidary), and the malachite found at the Thomson's River Copper Mine is not large enough for cutting.

At present green stones seem very fashionable, and small ornaments of nephrite from New Zealand (many by no means of a pretty colour) are much in demand. It may be of some use to call attention to a green colonial stone, that has been named Selwynite, after Mr. Selwyn, of which a short description may be found in the essay published by the Geological Department for the late colonial exhibition. It occurs in the upper Silurian rocks on the flank of the Mount Ida range, about four and a-half miles north-west of Heathcote, whether as a dyke or an irregular mass the explorations do not permit at present to be determined, though it is very probably connected with one of the many greenstone dykes traversing that district. As far as can be made out, the stone which was first observed, some years ago, was mistaken for copper ore, and a shaft of seventy feet was sunk in the mineral. From the heaps of stuff round the shaft Mr. Taylor, of the Geological Survey, who surveyed the country, obtained the specimens exhibited. The colour, as will be seen, varies from that of a siskin to dark emerald green; its hardness is about that of malachite, and it takes a very fair polish. It has, unfortunately, a tendency to crack, and is very brittle. This tendency may be, to a great extent, caused by exposure to atmospheric influences, and the freshly dug stone may be found without this tendency, and the great difficulty of cutting be obviated. As to the brittleness of this stone, Mr. Schaefer, the jeweller who made the pin exhibited, states that by boiling it in oil, and other treatment known to jewellers, it may, perhaps, be overcome even in the specimens which have been exposed. The analysis shows the per centage composition of the mineral to be silica, 47.15; chromium, 7.61; aluminia, 33.23; magnesia, 4.56; water, 6.23. It cannot be identified with any mineral described in the mineralogies, and is, therefore, quite new, and from its mode of occurrence, and its composition, it may

be considered as a new rock as well as a new mineral species. Its colour is given by the sesquioxide of chromium, which is probably derived from the chrome iron ore, a mineral abundant in the neighbourhood of Heathcote.

Gabo Island Granite.

This rock probably occurs as a dyke. Its mineral properties place it into the class of syentic granites. On the mainland it becomes more and more like a true granite in its composition.

The stone is so well known in Melbourne that it needs but a passing notice. It being used at the base of the Post Office, where it may be seen in a trimmed and untrimmed state, and at the Australasian Insurance offices, where there are some beautifully-polished pillars of it. It is very hard and tough, so much so as to prevent it coming into general use for building purposes; but its toughness renders it extremely useful for ornamental building purposes exposed to the weather or wear. A similar stone occurs at the head of Nuggetty Gully, Daisy Hill.

Geelong Greenstone.

Attention was first called to this stone many years ago by Mr. Daintree. In a report of his published in 1863, he says, "To the greenstone of the Geol. ¼ s. 24 S.E., I wish to call the attention of sculptors and workers in ornamental stones. Since, though hard to work it takes a beautiful polish, and the play of colours is little inferior to verd-antique." Though this notice was published five years ago only a few cabinet specimens have been cut and polished. Some of these taken to England and the Continent were much admired. Its toughness and closeness of texture would permit of its being used for many articles of jewellery. The fine play of colours is due to the Labradonte felspar, which constitutes a large per centage of the general green colour of the rock and is due to angill with some chlorite.

Lancefield Greenstone.

This large dyke-like mass of diorite (¼-sheets 5 S.E., and 5 N.E.; the latter unpublished), forming a high spur, with a meridional direction, from the Great Dividing Range, is very variable in its lithological character. Mount William, at the extreme northern and highest part of the range, and at its junction with the Great Dividing or Coast Range, is com-

posed of a very hard dark greenish-black dense rock, closely approaching a basalt, and with a metallic ring where struck, like clinkstone; passing southwards to a lighter green, hard rock with albite crystals, sometimes having the appearance of a greenish-white rock with black dendritic markings. This stone, were it not for its extreme hardness and consequent difficulty and expense in quarrying and working up, would make a very handsome stone for building or ornamental purposes. Further south it becomes a black, highly crystalline rock, and then again a dark green dense rock with specks of iron pyrites. About a mile north-east of Mount William, and in a saddle between it and the Black Range, is the site (locally called "The Native Tomahawk Quarries") whence the aboriginal tribes of the neighbouring districts have procured the greenstone used by them for making tomahawks. From the amount of broken and chipped stone covering a large area, this quarry must have been in use for a very lengthened period. The stone takes a very sharp edge. A large boulder stands up in the centre of an open pit, chipped all over superficially, and apparently in great requisition from its extreme hardness; but which has resisted all their efforts to raise it from its bed.

Benallic Shell Limestone.

This limestone is found in the valley of the Moorabool and at Barwon Heads. It resembles very closely the white limestone from Omaru, New Zealand, and might be used for the same purposes. It is especially adapted for light, ornamental mouldings, as it may be readily carved into figures with an ordinary knife. Specimens freshly removed from the quarry harden on exposure to the air, and are less readily worked, but it of course makes the stone more durable. Considerable care would be required in selecting the stone; for, in places it varies both in colour and texture, the colour becoming a pale brownish-yellow, and the texture more open when the fossils of which it is composed attain a large size. As a building material, it should be of considerable value in the country; but in large towns, where the atmosphere is always more or less charged with smoke and acid vapours, unless protected, it would be liable to blacken and decay. This could be prevented by silicating the stone by immersion in a solution of a soluble silicate, and then in one of chloride of lime, or washing the surface with these solutions after the erection of the building. This process,

which is readily and cheaply performed, would render the most delicate carvings in this stone impervious to smoke, and quite, if not more durable, than ordinary sandstone, and at much less cost.

The only uses to which this stone is applied are, the moderately porous portions for water-filters, and the friable parts for mixing with night-soil to be used as manure.

A sample which has been exposed to the acid vapours of the laboratory has in a year suffered but little.

ART. XIV.—*Notes relative to the respective theories, Creation by Law, and Creation by Fact.* By MR. THOMAS HARRISON.

[Read 10th August, 1868.]

Mr. Harrison in this paper sought to reconcile the various theories, (both religious and scientific) propounded as to the origin of man. Without absolutely agreeing with the doctrines of Lamerk, the Vestiges and Darwin, Mr. Harrison engrafts their views upon certain ideas of his own, best defined in the following sentence quoted from his paper, which trenches too much upon theological subjects to be printed in the Transactions.

"So far from shutting God out of his own creation, as the "pure development theory seems to do, the present view "represents him as continually superintending it."

ART. XV.—*Further Observations on Snake-Poisoning.* By GEORGE B. HALFORD, M.D., Professor of Anatomy, Physiology, and Pathology in the University of Melbourne.

[Read 27th August, 1868.]

In former papers communicated to this Society I have dwelt particularly on the vast numbers of white cells seen in the blood after death from snake-poison. Subsequent and repeated observation have confirmed my original description equally of the growth, size, and maculated condition under the influence of magenta of these bodies; but lately my friend Mr. Ralph, surgeon of Kew, near Melbourne, has discovered a nearly similar condition of blood in animals poisoned by prussic acid. I have confirmed his observations, and most probably such bodies will be found and arise wherever after death coagulation of the blood does not take